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Via Certified Mail 7003 1680 0001 3024 6111

November 14, 2013

Mr. Gary Miller, P.E.
Remediation Project Manager
1445 Ross Avenue, Suite 1200
Mail Code: 6SF-RA
Dallas, TX 75202-2733

Re: Updated Comments on the Draft Feasibility Study Report (FS) for the San Jacinto River Waste Pits Superfund Site, dated August 2013, provided on behalf of the Port of Houston Authority (Updated from HDR's October 21,2013 Memorandum)

Dear Mr. Miller:

Enclosed are the Port of Houston Authority's Updated Comments on the Draft Feasibility Study Report for the San Jacinto River Waste Pits Superfund Site, dated August 2013 (updated from HDR's October 21, 2013 Memorandum.) We would appreciate your review and consideration of these comments. If you have any questions, please contact me at 713-670-2663.

Very truly yours,

Linda Henry

Linda Henry

Enclosure

cc: Jill Burris (PHA)
Garry McMahan (PHA)

9494878

November 13, 2013

Updated Comments on the Draft Feasibility Study Report (FS) for the San Jacinto River Waste Pits Superfund Site (SJRWPSS), dated August 2013, provided on behalf of the Port of Houston Authority (Updated from HDR's October 21, 2013 Memorandum)

Introduction

On behalf of the Port of Houston Authority (PHA), HDR, Inc. has performed a technical review of the Draft Feasibility Study Report (Integral/Anchor QEA) dated August 2013. The review consists of the following six components:

- *Summary of Draft FS Analysis and PRP Recommended Remedy;*
- *TCRA Cap – review of installation, performance, and inspections/monitoring activities and the Review of Design, Construction and Repair of TCRA Armoring for West Berm of San Jacinto Waste Pits dated October 2013 and prepared by the U.S. Army Corps of Engineers {ACOE};*
- *General Review of document with regards to Draft FS content and USEPA CERCLA FS Guidance {1988}, in terms of completeness and in terms of the nine FS criteria used to identify, screen, and evaluate remedial alternatives;*
- *Specific Comments / Questions as were developed during our review of the Draft FS Report document;*
- *Comments with regard to the Hydrodynamic and Chemical Fate & Transport modeling used in the FS. Prior HDR review work with regard to the modeling was re-visited and a general review of the Modeling information including in the Draft FS appendices was conducted; however, no independent modeling was conducted for this memorandum; and*
- *Comments with regard to Remedial Design, and Long-Term Operations, Maintenance and Monitoring (OM&M} associated with the remedial alternatives considered.*

With each of the above-listed categories of review, HDR has developed comments (and questions / clarification needs) that can be presented to USEPA for overall consideration. Potential data gaps are also noted for USEPA to consider when assessing alternatives; key evaluation criteria of effectiveness, implementability, permanence, and costs; and OM&M considerations. Major comments, recommendations, or questions/clarification needs are noted in **bold text.** Depending on comments received and review of those comments by USEPA, additional information or analysis work may be required for the Final FS Report.

Summary of Draft FS Analyses and PRP Recommended Remedy

The Draft FS Report presents an analysis of six (6) potential alternatives to address elevated levels of contamination in sediment, achieve (Protective Concentration Levels) PCLs and / or

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surface weighted average concentrations (SWACs) established for the project with USEPA, and address potential risks to human health and the environment (as described and established in previous project documents). The Draft FS builds on the final Remedial Alternatives Memorandum (RAM; 2012} which included analyses to identify and screen potential remedial technologies for the site. This document also included a discussion of Remedial Action Objectives (RAOs), which were also carried forward into the Draft FS document. It is understood that the RAM, RI, and risk assessment documents (HHRA, BERA) have been reviewed and commented on by USEPA (and subsequently finalized by the PRPs under USEPA direction).

The alternatives evaluated in detail in the Draft FS are listed below. Estimated costs from the FS are provided for reference.

- *No Further Action ($1.3M; includes on-going inspection and maintenance of TCRA remedy)*
- *Institutional Controls (/Cs} and Monitored Natural Recovery (MNR); includes on-going inspection and maintenance of TCRA remedy ($1.6M}*
- *Permanent Cap, /Cs, MNR ($2.9M}*
- *Partial Stabilization/Solidification {S/S}, Permanent Cap, /Cs, and MNR ($11.2M}*
- *Partial Removal, Permanent Cap, ICs, MNR {$24M- $118M}*
- *Full Removal (all materials exceeding PCLs), /Cs, and MNR ($104M- $636M}*

The costs noted include capital (construction, implementation) along with Long Term Operation, maintenance & Monitoring (OM&M) costs. The 6 alternatives are evaluated with the nine (9) USEPA CERCLA criteria for evaluating remedial alternatives:

Two (2) Threshold Criteria (must be met)

1. Protection of Human Health and the Environment
2. Compliance with ARARs

Five (5) Balancing Criteria (to evaluate alternatives independently and against one another)

3. Long-term Effectiveness
4. Reduction ofToxicity, Mobility, Volume
5. Short-term Effectiveness
6. Implementability
7. Cost

Two (2) Modifying Criteria

8. State Acceptance. To be determined
9. Community Acceptance. To be determined

It is noted that all remedial alternatives included in the Draft FS – with the exception of Alternative 1 (No Further Action) – will meet the two threshold criteria. The TCRA cap –

installed within the site area in 2011 – is noted in many places within the Draft FS to be effective in reducing risk and meeting RAOs. Alternatives 1 and 2 include on-going OM&M of the existing TCRA with no or little additional measures. Alternatives 3, 4, and 5 include means to reinforce the TCRA cap and continue OM&M.

Following FS analyses, the PRPs recommend Alternative 3 (Permanent Cap over TCRA area, ICs, and MNR) as the preferred remedy.

Time Critical Removal Action (TCRA)

Because the TCRA cap prominently plays into the Feasibility Study analyses, a brief analysis and discussion of the TCRA cap is included in this section. We understand that over the last year or more, there have been issues noted with the TCRA's integrity, and concerns about long-term effectiveness and stability. USEPA (and ACOE) have conducted inspections and engineering design analyses during the post-installation timeframe, and a technical memorandum specific to the TCRA design and construction has been provided by ACOE to EPA and is currently under discussion between the EPA and the PRPs.

In October and November 2013, HDR received SJRWP TCRA-related documents from PHA. HDR performed a brief review of the following documents:

- Western Cell Revised Approach Letter, (5/2/2011, by USA Environment, L.P.).

- TCRA Daily reports (prepared by Anchor QEA, reports were available for 4/19/2011– 8/1/2011).

- TCRA Weekly Progress Reports (prepared by Anchor QEA; reports were available for April 18-22, 2011- Jan 2-6, 2012; prepared during and after construction activities).

- TCRA Monthly Reports (prepared by Anchor QEA, reports were available for 1/15/2012 -10/15/2013). Monthly reports replaced the required weekly reports.

- Post-TCRA Inspection Reports (prepared by Anchor QEA, reports were available for 5/17/12, 8/21/12, 2/15/13, 4/2013).

- USEPA Memorandum- First quarterly cap inspection at the San Jacinto River Waste Pits Superfund Site, February 24, 2012.

- USEPA Memorandum -Second quarterly cap inspection at the San Jacinto River Waste Pits Superfund Site, May 25, 2012.

- USEPA Memorandum -Western berm inspection of armor cap at the San Jacinto River Waste Pits Superfund Site, July 31, 2012.

- USEPA memorandum - quarterly cap inspection at the San Jacinto River Waste Pits superfund site,January 28, 2013.

- USEPA memorandum – quarterly cap inspection at the San Jacinto River Waste Pits superfund site, September 30, 2013 USEPA (including photographs and noted issues on fencing and trespassers at the site).

- November 1, 2013 EPA memorandum – ACOE Armor Cap Reassessment of Western Berm (with October 2013 UASCOE Review of Design, Construction and Repair of TCRA Armoring for West Berm of San Jacinto Waste Pits attached)

- July 24, 2012 photographs.

- TCRA Maintenance Completion Report, August 27, 2012, Anchor QEA.

Based on a review of the documents listed above, HDR identified the following issues associated with the TCRA remedy:

- The November 1, 2013 EPA memorandum (with the attached October 2013 ACOE Review of Design, Construction and Repair of TCRA Armoring for West Berm of San Jacinto Waste Pits) requires submittal of an Armor Cap Repair Workplan by the respondents within 30 days that addresses the design and construction concerns / conclusions of the USACOE report. Some of these concerns are (i) the design of the cap failed to consider wave runup and overtopping;(ii) the constructed slope in select areas of the cap is inadequate to meet required design needs; and (iii) materials that were used as part of cap construction are non-uniform and/or of inadequate size.

  The ACOE report also notes observations of considerable movement or loss of TCRA armor material following an estimated 10-year return storm event (photo log included in the report). The report also notes inconsistencies in the TCRA cap across the original design documents, the Final Removal Action Work Plan (Feb 2011), and the Time Critical Removal Action Alternatives Analysis (June 2010). For instance, Cap B/C is described in the February 2011document as using recycled concrete as part of the TCRA materials, while the June 2010 documents notes rock. The ACOE questions the appropriateness of recycled concrete particularly on steeper side slopes. The hydrodynamic modeling conducted for the design was also questioned by the ACOE, noting that some of the model inputs and assumptions may have underestimated stresses on the cap (that may have lead to inappropriate materials being selected).

Issues with the TCRA cap construction were also noted by the ACOE:

- Slope -The construction specifications did not include grading the water side of the west berm or adding fill to create a uniform slope. The slope should have been brought to the desired grade prior to placement of a geomembrane or geotextiles.

- Armor Cap Gradation -The Remedial Action Work Plan set forth requirements for the contractor as follows: "Verify Quality of Import Material. Import material must meet specified physical and chemical properties, as detailed in the Specifications, prior to the use of an imported material." A contractor submittal at the start of construction demonstrated that the material met the specifications; however, the gradation was not adequate to define the uniformity or the gradation curvature. No additional testing was presented to demonstrate and verify the consistency and uniformity throughout the project. A procedure should have been in place to verify the uniformity coefficient of the armor cap material. Ideally, a grizzly screen would have been used at the site to remove stone less than two inches from the Armor Cap B/C material. The fines could have been used at the site for base and filter material.

The ACOE report concludes with a summary of key findings regarding the design and construction (and failure) associated with the TCRA cap, along with recommendations for repair (including ensuring that the final surface throughout the repair area and adjacent areas has a slope of 1V:3H or flatter). <u>It is noted that these agency recommendations will require re-engineering and repair to parts of the existing TCRA cap. and may affect costs associated with the Remedial Alternatives presented in the FS Report</u>. Impacts to the USEPA's SJRWPSS RI/FS schedule are also likely.

- Anchor QEA's Post-TCRA Quarterly Inspection Report dated February 15, 2013 documented a January 2013 inspection where five areas that had less than 12 inches of stone cover thickness were identified; one 2 ft x 2 ft area also required placement of geotextile fabric. The USEPA was notified of a maintenance issue on January 15, 2013. A Maintenance Plan was submitted to EPA on January 23, 2013 and approved the next day. TCRA cap maintenance began on January 25, 2013 and was completed on January 31, 2013. A Maintenance Completion report was prepared and submitted to EPA on February 15, 2013 and documents that two breaches in perimeter fencing were observed and repaired, and five areas in the eastern cell were repaired. After Maintenance Plan approval, the EPA conducted an inspection (see EPA's January 2013 memo) and noted that geotextile fabric was visible in two areas in the northwest corner of the western cell. These areas were also repaired as part of maintenance activities.

- The October 15, 2012 TCRA Monthly Report prepared by Anchor QEA notes that an independent evaluation of the engineering design of the TCRA armored cap was initiated, as requested by the USEPA in its October 10, 2012 letter. Anchor QEA submitted a TCRA Report on Reassessment of Design and Construction to USEPA on April 5, 2013, according to their TCRA Monthly Report #15 (April15, 2013}.

- Anchor QEA's Post TCRA Quarterly Inspection Report dated August 21, 2012 documented a July 20, 2012 inspection where a reduction in the thickness of the stone cover along the western (river-side) edge of the western berm was observed. The USEPA was notified verbally the same day, and in writing the following day. An USEPA inspection was conducted on July 24, 2012 and erosion and bulging was noted (see EPA's July 31, 2012 Western Berm Inspection Memorandum). USEPA stated it would conduct a third party review of the overall cap design and construction. In addition, USEPA requested a reassessment of the cap design and construction, with a detailed report about the western cap failure. An August 27, 2012 TCRA Maintenance Completion Report, prepared by Anchor QEA, explains that a Cap Repair Plan was submitted to USEPA on July 26, 2012 and approved on July 31, 2012. The approved work was completed during August 1 - 6, 2012.

- Anchor QEA identified Qne breach in perimeter fencing in their May 17, 2012 Post-TCRA Quarterly Inspection Report. The breach was at the west end of the perimeter fence (west bank on the south side of 1-10) and measured approximately 18 inches by 24 inches. A breach was also noted in December 2011in the same location.

- According to Anchor QEA's May 19, 2011 Daily Report, an area of visible water and a softer subgrade was observed in the Western Cell. The area was to be marked so that heavy equipment would not enter the area during placement of the armored cap. Their Weekly Progress Report #35 (July 11, 2011) also notes that portions of the Western Cell were stabilized (cement stabilization) to improve access and facilitate cap construction.

- On May 24, 2011, suspected paper mill sludge was found in a five-foot test trench (central berm). On May 25, 2011, suspected paper mill sludge was observed in an approximate 40-foot section of trench in the south berm nearest to the central berm. These two trenches were filled in and relocated.

Other Comments:

- Anchor QEA notes in Monthly Report #1 that there are potential impacts from San Jacinto River Fleet's (SJRF) operations such as suspending sediments in the area and causing problems downstream and on the TCRA armored cap. No specificity was given in any of the information reviewed. Further, in Monthly Report #21 (October 2013), the Respondents reported to have notified USEPA of, and previously addressed in their monthly reports, their concerns regarding SJRF's operations in the vicinity of the Site due to potential adverse impact on the TCRA armored cap. Pursuant to an email dated February 9, 2012, USEPA's counsel forwarded to Respondents' counsel a copy of a draft sampling and analysis plan prepared for SJRF (SJRF Draft SAP). The SJRF Draft SAP purports to address "existing environmental impact that could be disturbed by SJRF's commercial operations" in the vicinity of the Site.

It is recommended that a detailed discussion of all problems noted with the TCRA cap limits and corrective actions performed to date be included in the FS Report. The SJRF activities / Draft SAP should also be tracked to ensure that proposed activities by SJRF are understood, and are consistent with and will not negatively impact the TCRA cap and the site remedy ultimately selected by EPA.

If substantial repair, re-design, or other measures are required and approved by Federal Agencies, it is noted that parts of the FS (including but not limited to RAO discussion, alternatives analysis, screening of capping / containment technologies, and cost estimates) will have to be re-worked in the Final FS Report.

Additional comments on remedial design (i.e., as will occur subsequent to USEPA remedy selection and Record of Decision) are included in the last section of this memo.

General Review of Draft FS Report

In general, the Draft FS is presented in accordance with USEPA guidance. Site background information, RAOs, ARARs, development of remedial alternatives, and analysis/comparative analysis of remedial alternatives considering the nine USEPA criteria are presented in text/tabular formats. As alluded to earlier, the Draft FS refers to work presented in previous project deliverables notably the RI, risk assessments, site modeling reports, and the RAM. Comments on some of the major FS Report items are included below.

Protective Concentration Levels (PCLs). Recommended Dioxin/Furan PCLs used in the Draft FS were spot-checked against May 2013 correspondences and information from the RI Report (it is understood that target PCLs presented in the 2012 RAM have since been updated by USEPA). These values were used to define the locations, dimensions, and extents of the remedial alternatives. They are as follows:

- Sediment outside of TCRA footprint: TEQ $_{oF,M}$ = 220 ng/kg (based on hypothetical recreational visitor)
- Sediment/soil within TCRA footprint: TEQ $_{oF,M}$ = 1,300 ng/kg (based on commercial / industrial use)
- Soil outside of TCRA footprint: TEQ $_{oF,M}$ = 1,300 ng/kg (based on hypothetical recreational visitor). All surface soil meets this criterion.
- Soil south of 1-10: : TEQ $_{oF,M}$ = 450 ng/kg (based on hypothetical construction worker)

It is understood that USEPA has reviewed and endorsed these PCLs for dioxins/furans. It is noted that the PCL previously developed for the hypothetical subsistence fisher (110 ng/kg) was NOT considered in the Draft FS; this appears reasonable given proposed institutional controls but should be confirmed by USEPA. It is further assumed that USEPA has acknowledged that other sediment/soil contaminants of concern (metals, PCBs) that are present in the site area are either (a) largely co-located with dioxins/furans (and will thus be concurrently addressed with the remedy) or (b) from sources not associated with PRP activities.

Importantly, the PRPs note a USEPA directive to "address material that exceeds 13,000 ng/kg TEQ $_{DF,M}$ within the USEPA's Preliminary Site Perimeter". Since the conceptual layouts (areal and volume estimates) of Alternatives 4 and 5 in the Draft FS use this action level, its adequacy for remedial planning should be confirmed by USEPA. Alternative 6 considers full removal to PCL levels (to 220 ng/kg).

Remedial Action Objectives (RAOs). Five (5) RAOs are presented in the Draft FS based on source control of dioxin/furan and elimination of exposure pathways to humans and ecological receptors. These RAOs are the same as the preliminary RAOs that were presented in the Final RAM (December 2012) and are assumed to be approved by USEPA. The RAOs appear reasonable and appropriate for the goals of the project and what a future remedy must achieve. The performance of the TCRA cap is noted in the Draft FS to have already achieved (or is/will be achieving) several of the 5 RAOs (at least within the TCRA footprint of the site). However, it is recommended that any and all OM&M information that is gleaned from the TCRA's performance be incorporated into the RAO write-ups (and other parts of the FS), based on the concerns described in the above section.

With regard to RAO 4 (reduce human direct contact to upland soils), the FS notes that dioxin/furan (and other COC) levels in upland soils are not a concern as long as subsurface excavation does not occur. Based on the construction worker scenario on which the PCL was based, excavation can occur in the future (4 -10 ft bgs) prompting potential exposures to contaminants in subsurface soil. It is thus recommended that the FS remedial alternatives be updated to account for impacted soils (TEQ $_{DF,M}$ > 450 ng/kg) located in the area of investigation south of I-10. Hot-spot excavations based on the most elevated soil concentrations within the top 10 ft of soil should be considered. Institutional controls can also be updated to include soil management plans, appropriate fencing and signage, and other means to prevent subsurface exposure to contamination by construction, landscaping, utility, and other workers who may be involved with excavation work in this area in the future.

Applicable or Relevant and Appropriate Requirements (ARARs). Chemical-, location-, and action-specific ARARs are presented in text and tabular formats in the Draft FS Report. Categories of ARARs identified as being applicable to the remedial alternatives include: PCls for sediment and soil; Federal and State Water Quality and Water Resources rules (CWA, Texas Surface Water Quality Standards, Rivers and Harbors Act, Obstructions to Navigation); Protected Species Requirements; Coastal Zone Management; Floodplain; Cultural Resources Management; construction considerations (noise control, hazardous materials management).

Best Management Practices (BMPs) are noted as a future activities to remedy discharges. It is noted that State / local permits can typically be waived for on-site CERCLA work.

In addition to the ARARs identified in the Draft FS, the following should be considered for inclusion (as ARARs or potential ARARs): Toxic Substances Control Act (TSCA; governing transport, handling, and disposal of PCB-contaminated sediment or residues); and Occupational Safety & Health Act (OSHA; applicable to any remedial construction actions). It is possible that the State or other stakeholders will suggest additional ARARs to be included in the Final FS Report.

Development of Remedial Alternatives. The FS notes that the identification and screening of remedial technologies is provided in the RAM (2012). The RAM provided the following discussions/analyses relevant to the FS:

- General Response Actions
- Identification/Screening of Remedial Technologies (in-situ, ex-situ; treatment; containment; removal; disposal approaches). Screening based on criteria of effectiveness, implementability, and cost. Analysis and screening for different types of sediment management areas (navigation channel, nearshore area, open water area, fixed structure, TCRA) was also conducted in the RAM.
- Dioxin treatability information
- Preliminary remedial alternatives
- Comment on TCRA effectiveness

A cursory review of the RAM as part of this Draft FS review indicates that the above information and preliminary remedial alternatives appear to be tied together with the information and final remedial alternatives that are presented and assessed in detail in the FS. In addition, it is understood that USEPA has commented on and accepted the final RAM document – including technology analyses and preliminary alternative screening contained therein - to their project files. It is also understood that target PCLs presented in the 2012 RAM have been updated by USEPA in 2013; thus, remedial areas / dredge volumes initially considered for the RAM alternatives have been modified/reduced in the FS). It is possible that USEPA may require the integration of relevant RAM information into the Final FS Report, so that all information pertaining to remedial technologies and alternatives is contained in one document.

The Draft FS Report appears to provide a range of alternatives, from No Further Action to Full Removal, with associated ranges of levels-of-effort and costs to implement. Superfund FS Reports typically include a "true" No Action alternative ($0) so that a baseline scenario can be established; it is recommended that a No Action alternative be added to the FS. All alternatives can meet the two threshold criteria of Protection of Human Health and the Environment and Compliance with ARARs and thus appear to be viable options for the site (and appropriate for USEPA to consider). Given the relatively large differences in costs among the remedial alternatives, it may be useful for the FS to develop and present an additional remedial alternative(s) to "bridge" the largest cost differentials (e.g., $11M Alternative 4 and $24M - $118M Alternative 5). Such additional alternatives can look at other sediment technologies (e.g., ex-situ treatment, alternative removal approaches) or combination of technologies with removal. It is also important to note that the cost ranges for partial removal (Alternative Sa and Sb) and full removal (Alternative 6a and 6b) may be close to one another when considering the different disposal assumptions; i.e., Alternative Sb (partial removal; incineration) is similar in cost to Alternative 6a (full removal; landfill). Although these costs are conceptual, they demonstrate how the ultimate handling of dredged materials can drive costs.

The below paragraphs provide overview comments on the alternatives presented in the Draft FS Report. It was recommended above that a true No Action alternative be prepared as a baseline. Summaries of Alternatives 2 – 6 are provided below, with comments on "Pros" and "Cons" associated with each and as compared with other alternatives. Brief evaluations of the USEPA FS Evaluation Criteria are added below, where appropriate. The below alternatives analyses are based on HDR's review of the Draft FS Report and on professional experience, along with reviews of information related to the TCRA cap (as described earlier in this memorandum).

Alternative 2: /Cs and MNR. The description *of* the ICs and MNR in Alternative 2 is important since they are also elements of Alternatives 3-6. ICs described in the text (restrictions on dredging and anchoring, deed restrictions, public notices, and signage) are consistent in concept with ICs employed at other Superfund sites. Importantly, a periodic sampling and analytical program would be implemented under Alternative 2 to monitor the progress of natural recovery. Finalization of such ICs- and monitoring program -will need to be refined with USEPA and stakeholders during the design phase (after a remedy is selected). ICs should be designed so that they do not or minimally interfere with existing aquatic and land uses in the area. It is recommended that the cost estimating tables in Appendix C of the FS include specific line items for establishing and monitoring institutional controls (for each alternative where ICs are included).

Alternative 3: Permanent Cap, /Cs, MNR (PRPS[1] recommended remedy). Adds permanent cap to TCRA containment remedy (3400 cy placed); increase in factor of safety in current TCRA design; flattening submerged slopes; use *of* rock sized for "no displacement". The approaches noted in this alternative for the TCRA containment should be in accordance with USEPA and ACOE recommendations, and revisions to the alternative description and cost estimate should be reflected in the FS Report.

- Positives: Two month construction duration (lowest short-term impacts). No disturbance of TCRA cap. $2.9 M estimated cost (relatively low).

- Based on modeling presented in the FS, minimum resuspension, release, and residual dioxin/furan – and other COCs – are expected in surface sediment and water column during the implementation of this Alternative.

- Negatives: No treatment or removal is included in this alternative. Smallest remedial area among alternatives. Some sediment points with dioxin/furan levels above 13,000 ng/kg would be left unmitigated. Does not actively reduce toxicity or volume of contamination.
- Comments: TCRA cap integrity information and recent OM&M efforts should be incorporated into the Alternative 3 analysis in the Final FS.

Alternative 4: Partial Solidification/Stabilization, Permanent Cap, */Cs,* ***MNR.*** Includes TCRA cap enhancements exactly as included in Alternative 3 (i.e., 3400 cy placed; increase in factor of safety in design; flattening submerged slopes; use of rock sized for *uno* displacement"). The approaches noted in this alternative for the TCRA containment should be in accordance with USEPA and ACOE recommendations, and revisions to the alternative description and cost estimate should be reflected in the FS Report. Alternative footprint is approximately 2.6 acres (western cell) and 1.0 acre of submerged sediment spanning the eastern Cell and the northwestern area of the TCRA footprint.

- Positives: Solidification/ Stabilization treatment technology provides direct reduction in toxicity and mobility (applied to 53,300 cy of sediment and soil). Technology can work for dioxin/furan and other COCs. TCRA cap to be removed/replaced. FS Figure shows that S/S remedy will address all sediment points with dioxin/furan levels above 13,000 ng/kg in the TCRA area. $11.2 M estimated cost (relatively low to moderate as compared with other alternatives in the FS).
    - Relatively low or moderate level of resuspension, release, and residual dioxin/furan – and other COCs – are expected in surface sediment and water column during the implementation of Alternative 4.
- Negatives: Relatively long construction duration (15 months), resulting in moderate to high degree of short-term impacts. In-water remedial work, including TCRA containment replacement, to require monitoring for suspended solids. Some sediment locations with dioxin/furan concentrations above 1,300 ng/kg will remain under Alternative 4.
- Comments: TCRA cap integrity information and recent OM&M efforts should be incorporated into the Alternative 4 analysis in the Final FS.

Alternative 5: Partial Removal, Permanent Cap, */Cs,* ***MNR.*** Includes TCRA cap enhancements exactly as included in Alternative 3 (i.e., 3400 cy placed; increase in factor of safety in design; flattening submerged slopes; use of rock sized for *uno* displacement"). The approaches noted in this alternative for the TCRA containment should be in accordance with USEPA and ACOE recommendations, and revisions to the alternative description and cost estimate should be reflected in the FS Report. FS report presents two sub alternatives: Sa (assumes disposal of excavated material; $23.8M) and Sb (assumes off-site incineration; $117.9 M). Alternative footprint is same as Alternative 4 (i.e., dredging / removal of approximately 53,000 cy assumed).

- Positives: Removal technology provides direct reduction in volume and toxicity, and best addresses long-term mobility potential. Technology can work for dioxin/furan and other COCs. TCRA cap to be removed/replaced. Alternative 5 will address all sediment points with dioxin/furan levels above 13,000 ng/kg in the TCRA area. $23.8 M estimated cost for off-site disposal (Sa) is relatively moderate as compared with other alternatives in the FS; $118M estimated cost for off-site incineration (Sb) is high compared with other alternatives.
- Negatives: Relatively long construction duration (12 months), resulting in moderate to high degree of short-term impacts. Dewatering or pre-treatment of removed material may be needed prior to off-site disposal/incineration (on-site, upland space may be needed). In-water remedial work, including TCRA containment replacement, to require monitoring for suspended solids. Some sediment locations with dioxin/furan concentrations above 1,300 ng/kg will remain under Alternative 5.
  - o Moderate to low level of resuspension, release, and residual dioxin/furan – and other COCs- are expected in surface sediment and water column during the implementation of this Alternative, based on the modeling conducted for the FS. As noted in a below section, the accuracy of PRP modeling- and recovery rates from "clean" sediment moving into the site area- is questioned.
- Comments: TCRA cap integrity information and recent OM&M efforts should be incorporated into the Alternative 5 analysis in the Final FS. Removal/dredging remedies require specific work elements (cut-off walls; dewatering; sequencing of work (tidal influences); monitoring for release/resuspension of contaminants). Re-suspension potential (and cross contamination of surface sediment and water column post remedy) is a consideration based on case histories presented in the Draft FS report and modeling conducted.

Alternative 6: Full Removal of material exceeding PCL (220 ng/kg), /Cs, MNR. Includes removal of all impacted sediment- within and outside of TCRA area- to meet PCL (220 ng/kg). FS report presents two sub alternatives: 6a (assumes disposal of excavated material; $104M) and 6b (assumes off-site incineration; $636 M). The Alternative 6 footprint is the largest of all alternatives presented in the FS. Approximately 210,000 cy of material to be dredged / removed.

- Positives: Removal technology provides direct reduction in volume and toxicity, best addresses long term mobility potential ("eliminates"). Technology can work for dioxin/furan and other COCs. TCRA cap to be removed. Alternative 6 will addresssediment points with dioxin/furan levels above 220 ng/kg in the USEPA's Preliminary Site Perimeter. Full removal of PCLs offered in this remedy.
- Negatives: Longest estimated construction duration (16 months), resulting in high degree of short-term impacts. Dewatering or pre-treatment of removed material may be needed prior to off-site disposal/incineration (on-site, upland space may be needed). In-water remedial work to require monitoring for suspended solids.

- o Highest level of resuspension, release, and residual dioxin/furan- and other COCs- are expected in surface sediment and water column during the implementation of this Alternative based on the modeling conducted for the FS. As noted in a below section, the accuracy of PRP modeling- and recovery rates from "clean" sediment moving into the site area- is questioned.

- Comments: Removal/dredging remedies require specific work elements (cut-off walls; dewatering; sequencing of work (tidal influence); monitoring for release/resuspension of contaminants). Re-suspension potential (and cross contamination of surface sediment and water column post remedy) is a consideration based on case histories presented in the Draft FS report and modeling conducted.

The PRPs recommend Alternative 3 as the preferred remedy (permanent cap; ICs; MNR), and cites its recommendation based on a comparative analysis of the six alternatives against the FS balancing criteria. The Draft FS Report states that Alternatives 4, 5, and 6 each offer less environmental benefit or reduction in risks, greater uncertainties related to implementation, an extended construction schedule, higher short-term impacts, increased safety risks, higher community impacts, and significantly greater costs. Below are comments on the PRPs' analysis of alternatives with regard to the FS criteria.

- ENVIRONMENTAL BENEFIT / RISK REDUCTION. It has been noted in the RAM and Draft FS Report that all of the remedial alternatives carried forward for detailed evaluation can meet the two threshold criteria of Protection of Human Health and the Environment, and Compliance with ARARs. As such, the argument that Alternatives 4, 5, and 6 fail to offer sufficient benefit / risk reduction is unfounded. These types of remedies (treatment, removal) have been successfully designed, implemented, and monitored / maintained to ensure RAOs are met at several Superfund sites across the U.S.

- <u>UNCERTAINTIES RELATED TO IMPLEMENTATION.</u> As noted in the above paragraph, containment, treatment, and removal remedies have been successfully designed and constructed at many sediment sites in the U.S. Higher uncertainties during implementation are inherent in more robust remedies; however, proper design should account for this. Agency feedback recently received for the TCRA cap design criteria should be considered for the remedy that is ultimately selected by USEPA. Technologies / remedies that are more complex in nature should not be precluded from serious consideration because they often – as is the case here – provide higher levels in reduction of contaminant toxicity, volume, and/or mobility which are important considerations for long-term permanence.

- <u>EXTENDED CONSTRUCTION SCHEDULE</u>. The construction schedules presented in the Draft FS Report range from 2 months (Alternative 3) to 16 months (Alternative 6). Given the large industrial and commercial nature of the site area, it is submitted that any of the construction durations considered would not present significant impacts to the project area.

- HIGHER SHORT-TERM IMPACTS. The PRPs claim Alternative 4, 5, and 6 would require removing all or part of the TCRA cap (and disturbing impacted sediments in the process which may cause deleterious environmental impacts). Further, it is noted that re-suspension of contamination can occur for the Alternative 5 and 6 removal approaches. Although the scenario of disturbance (turbidity, leaks through containment sheetpiling) and contaminant resuspension can perhaps be better visualized for removal remedies, it is recommended that more explanation be provided for Alternative 4 (Partial solidification/stabilization) in the Final FS Report. How much disturbance would occur ? What controls / monitoring could be designed if this remedy is selected ? Did cost estimate in the Draft FS include such measures ?

  As noted above, a range of remedial technologies for impacted sediment- including removal / dredging- have been successfully designed and implemented at other Superfund sites. Real-time contaminant monitoring (water column; sediment in perimeter of work areas during construction, and biota/tissue sampling post-construction) have met with USEPA's satisfaction. Further, HDR's review of the FS modeling (see below) indicates that "clean" sediment loading may occur at a higher rate than predicted by the PRPs leading to faster natural recovery post-remedy installation.

- INCREASED SAFETY RISKS. Worker safety concerns (mainly during construction) are also raised by the PRPs in the evaluation of Alternatives. Specifically, it is noted that Alternatives 4, 5, and 6 include increased probabilities of non-fatal and fatal injuries as compared with the preferred Alternative 3 (8-21 times increased probability in non-fatal and fatal injuries). Analyses cite labor / construction trade statistics and assume remedy construction timeframes and work hours anticipated. All worker safety concerns should be appropriately addressed in the Remedial Design phase of the project (after remedy selection) and with detailed H&S Plans. Complex remedial actions – at other Superfund sites and including the TCRA implementation at the site – have documented that safety concerns can and should be appropriately addressed. It is noted also that safety risks are not one of the nine USEPA FS balancing criteria (but can be presented as part of short-term impacts or implementability criteria). The agency feedback regarding the TCRA cap design, construction, and repair should be followed as appropriatfor the ultimate remedy for the site, as proper planning, design, and construction will lead to a more intact, stable remedy that may result in even lower safety risks.

- COMMUNITY IMPACTS / SUSTAINABILITY. Although sustainability is an important aspect for the site and region to consider, it is not one of USEPA's nine remedy evaluation criteria. The PRPs appear to be putting elevated emphasis on sustainability and community impact concerns (traffic, air emissions, greenhouse gas production particularly during remedy construction) under the short-term effectiveness / impact criteria.

Alternatives 4, 5, and 6 are assumed to have "greenhouse gas, and PM and ozone emissions" impacts estimated at several times higher than Alternative 3. For Alternative 4, "Traffic and community impacts" (measured as truck trips) are estimated to be about 6 times higher than Alternative 3. These concepts of sustainability are important to understand remedy life cycle and are increasingly presented as part of FS / RD documents. However, USEPA should feel comfortable with these estimates, and ask/consider:

- Will a more permanent remedy than 1, 2, or 3 actually reduce such footprints in the long run because OM&M is decreased (in terms of truck trips, equipment operation, and/or expected remedy life) ?
- Will a (small) tradeoff in short-term community or sustainability impacts - which can in part be remedied during design and construction – make for a more reliable, acceptable remedy ?
- Considering the industrial / commercial nature of the immediate site area, the presence of highly trafficked transportation corridors (1-10), and ambient air quality that exists, would incremental air emissions associated with treatment / removal alternatives be significant ?

- <u>LONG-TERM EFFECTIVENESS.</u> The FS also notes that there is no increased long-term benefit from implementing Alternative 4, 5, 6. However, it is surmised – based on the detailed alternative descriptions in the FS – that Alternative 4, 5, and 6 would provide enhanced stabilization (treatment in Alternative 4) or permanence (sediment removal as per Alternatives 5 and 6) over the Alternative 3 cap option. Further, removal under Alternatives 5 and 6 are the only alternatives that offer a relatively quick reduction in volume and toxicity. It is submitted that removal (full or partial) is attractive to USEPA and stakeholders because it is permanent, and would potentially offer more flexibility in future navigation / harbor activities (such as channel deepening) because those activities would not need to consult OM&M plans or institutional controls in place for capping remedies. Agency feedback recently received for the TCRA cap design criteria should be considered for the remedy that is ultimately selected by USEPA.

The below "ranking table" was compiled based on HDR's review of the Remedial Alternatives presented in the Draft FS (including the bullet notes offered above). This matrix was developed to provide a rough "ranking" of the Alternatives based on a comparative analysis of the FS balancing criteria. It must be qualified that this exercise is general and somewhat subjective, and includes the following assumptions:

- The FS evaluation criteria are evaluated for each alternative, with the alternative that scores "highest" (or that may score "highest") for a single criterion receiving a score of "A".
- Letter scores of A to E are assigned to each box (A being "best /preferred", E being "worst / least preferred" in terms of the specific criterion). This analysis is linear; no weighting was

applied in terms of incremental differences in criteria, for instance the large differences in costs.

- o Recent information on the TCRA cap is considered in the below analysis (e.g., integrity issues lead to lower scores for Alternatives 1, 2, and 3).

	Alt.I (NFA)	Alt. 2 (ICs, MNR)	Alt. 3 (Permanent Cap, ICs, MNR)	Alt. 4 (S/5, Permanent Cap, ICs, MNR)	Alt. 5 (Partial Removal, Permanent Cap, ICs, MNR)	Alt. 6 (Full Removal, ICs, MNR)
FS CRITERIA						
Long Term Effectiveness	E	D-E	D	C	B-C	A
Reduction of Tox, Mob, Volume	E	E	D	B-C	B	A
Short-Term Effect / Impact	A	A-B	B	B	C-D	C-E
Implementability	A	A	B	B-C	C-D	D-E
Cost	A	A	B	C	D	E

The above aggregate scores should not be used to justify "selection" of a remedy for the site, or justify preference of one remedy over another. Rather, the criteria scores are meant to provide additional perspective on how the alternatives could compare to on another.

Specific Comments / Questions on the Draft FS Report (August 2013):

1. Alternative 1- No Further Action. Please clarify if OM&M costs associated with the TCRA cap is for 3 events (as per text) or for 6 (as per cost estimate).
2. Please clarify if the cap maintenance cost in Alternative 2 is for 3 events (as per text) or for 6 (as per cost estimate).
3. As per Section 2.4.1, salinity ranges in the River from 2 to 20 parts per thousand. Please clarify what stabilizing agents will be considered for Alternative 4. Please also clarify in the development of alternatives if a treatability study will be performed and include costs, if applicable.
4. No costs for institutional controls have been included in Alternatives 2 through 6. Please clarify.
5. Please clarify if dewatering costs and effluent disposal costs have been considered while developing the cost estimates for Alternatives 5 and 6.
6. Alternatives 4, 5, 6- Please clarify in the development or detailed analysis if USACE permits or other relevant permits are applicable to the implementation ofthe alternative while addressing the submerged areas.

7. Please clarify why costs for five year reviews and present value analysis have not been included for each of the Alternatives. Please clarify if any periodic costs have been considered for the maintenance of institutional controls in each ofthe Alternatives.
8. Please clarify if any end point samples will be taken under Alternatives 3 through 6 and include costs if applicable.

Comments with regard to the Hydrodynamic and Chemical Fate & Transport modeling used in the FS.

Specific modeling applications used in the Draft FS Report included:

- Long-term simulations of post-TCRA future conditions, which provide estimates of rates of natural recovery (i.e., reductions in estimated water column and surface sediment dioxin and furan concentrations over time). Applicable Alternatives 1, 2, and 3 of the FS.
- Long-term simulations of alternatives containing in-water sediment remediation (i.e., Alternatives 4, 5, and 6). Future sediment and water column dioxin and furan concentrations from these simulations were used to evaluate potential short- and long-term impacts associated with construction activities and remedy implementation (such as possible sediment resuspension and release during removal/ dredging, and effects of dredge residuals and sediment deposition [recovery] post-construction).

As part of this review, the overall FS report was examined, with an emphasis on the application of the hydrodynamic, sediment transport, and contaminant transport and fate model that was used as a basis to evaluate remedial alternatives. The SJRWP "Fate and Transport Study" (FTS) report describing model development efforts was also reviewed in order to better understand the context of uncertainties in the model and how those uncertainties are likely to influence FS conclusions and recommendations.

The computer model developed as part of SJRWP FTS is based on the Environmental Fluid Dynamics Code (EFDC) framework. Its application to the SJRWP superfund site, numerous assumptions and simplifications were made. Although many of the assumptions in the FTS are typical of other model development efforts, the **uncertainties these assumptions introduce into the model application in the FS were generally not clearly identified or properly evaluated.** In particular, and in contrast to claims purporting the model is "predictive" and "quantitative", the **model may not provide a reasonable basis to evaluate FS alternatives.**

Uncertainties that may impair the model's ability to evaluate FS alternatives include, but are not necessarily limited to, the following:

- **Representation of upstream boundary conditions, particularly sediment loads at the Lake Houston Dam;**

- Simulation of sediment transport and the representation of hard bottom areas along the river channel downstream of Lake Houston;

- Oversimplification of processes, particularly the failure to account for the influence that salinity differences is expected to have on fine sediment deposition;

- Representation of model initial bed properties such as grain size distributions;

- Simulation of net sediment transport within the Preliminary Site Perimeter;

- Application of the model at spatial and temporal scales finer than the scales over which model performance is reliable.

A brief description of these uncertainties and how they may influence or potentially bias alternative evaluations in the FS follow.

Representation of Upstream Boundary Conditions

Upstream solids loads are expected to be the largest external source of solids entering the model domain. The FTS report suggests that the Lake Houston load, which is estimated to be 381,000 metric tons (MT) per year, is roughly 80% of the total load to the system. Uncertainty in load from Lake Houston is therefore reasonably expected to have a pronounced impact on the outcome of sediment transport simulations. However, based on our understanding of the FTS report, suspended sediment concentration (SSC) measurements do not occur at the Dam or immediately downstream of it. Consequently, the load at the Dam was inferred from uncertain sediment rating curves for upstream tributaries and an uncertain, assumed reservoir trapping efficiency estimate. Figure 4-15 of the FTS report suggests that SSC concentrations at any flow rate range by a factor of 2 at the flow end of the flow spectrum to nearly a factor of 100 at moderate to high flow rates. Given the nearly two order of magnitude variation in SSCs at typical river flow rates, it is unclear what basis was used to conclude that examining a factor of 2 range in upstream load estimates provides a "quantitative evaluation" of uncertainty (see AQ, 2012 p. 41).

Given its uncertainties, it is unclear whether the load over the Lake Houston Dam provides a reasonable basis to drive the sediment transport model, let alone evaluate alternatives in the FS. In peer reviews of modeling efforts for other sites (e.g., Lower Fox River, Housatonic River, etc.), uncertainties in upstream boundary conditions have been identified as factors that limit model reliability because errors in loads can in some situations be compensated by making other adjustments to parameters that affect the balance of fate processes (i.e., model results may match short-term measurements to some extent but may not properly represent long-term processes).

Recent information from the Texas Water Development Board (TWDB, 2013) suggests that the upstream solids load used in the FTS model may underestimate solids delivery over the Dam. Results of a 2011 TWDB volumetric survey of the reservoir indicate that Lake Houston has a total reservoir capacity of 124,661 acre-feet and encompasses 10,160 acres at its conservation pool elevation (41.73 feet NAVD88). The TWDB survey also estimates that Lake Houston loses from 344 to 689 acre-feet of capacity per year due to sedimentation. Given the FTS outflowing load estimate of 381,000 MT/year and the assumed reservoir trapping efficiency of 40% (see AQ 2012 p. 40), the estimated incoming average sediment load to the Lake is 635,000 MT/year. Sedimentation accumulation of 344 acre-feet per year equates to 424,317 m3/yr of sediment volume buildup on the lake bed. Given dry bulk densities in the range of 830 to 1,400 kg/m3 as described in the FTS, this corresponds to 352,000 to 594,000 MT/yr of deposition on the lake bed and further equates to reservoir trapping efficiencies ranging from 55% to 93%. Sediment accumulation of 689 acre-feet per year corresponds to 705,000 to 1,190,000 MT/year of deposition and suggesting impossible high trapping efficiencies of 110 to 187%. This range of trapping efficiencies is much higher than would be expected and suggests that FTS solids loads into and out of Lake Houston are underestimated in the FTS and are underestimated by much more than a factor of 2. Further investigation of upstream sediment loads is warranted.

Simulation of Sediment Transport and Hard Bottom Areas

The FTS representation of sediment transport and the hard bottom areas such as the river reach from Lake Houston to where the river widens at Grennel Slough also seems problematic. Although descriptions in the FTS report are not explicit, it appears that representation of the riverbed as "hard bottom" means that sediment transport processes in this part of the system were not simulated (i.e., no erosion and no deposition). If this inference is correct, it means that in hard bottom areas the modeling approach violates basic physical principles. For example, in hard bottom areas the model may not perform deposition calculations, implying that in hard bottom cells, the downward force gravity is not allowed to transport particles to the riverbed. Consequently, instead of properly representing the expected balance between erosion and deposition in those areas, the model performance is artificially constrained by the a priori definition of bed type rather than by proper representation of sediment transport. Thus, the difficulties in specifying realistic upstream sediment loads are compounded by constraints applied to the model such that there is no clear basis to determine if sediment transport through the primary study perimeter are realistic. Model performance may seem acceptable more as a result of the a priori determination of where sediment is allowed to deposit rather than because of the model ability to simulate sediment transport. Hard bottom areas also occur in other parts of the model domain. Those areas also act to artificially constrain the model to limit deposition to non-hard bottom areas. Consequently, the model may not have the ability to "predict" sediment transport (as much as it is "hardwired" to yield a pre-determined outcome).

At a minimum, it is recommended that the model code and inputs be examined. If the model code has checks to determine bed type before deposition occurs, then the model outputs may be artificially limited to achieve pre-determined patterns of sediment transport.

Oversimplification of Processes

Models are by necessity simplifications of the complexity found in nature. However, care is needed to ensure that processes that are important at the spatial and temporal scales of model operation are not inappropriately excluded. The FTS model neglects the effect that changes in salinity are expected to have on fine, cohesive particle deposition. Given that upstream salinity is effectively zero and that downstream values are on the order of 20 parts per thousand (ppt), a strong salinity gradient exists within the model domain. Increasing salinity is typically associated with fine sediment flocculation and deposition (i.e., shoaling) because the increasing ionic strength of saline water suppresses the effects of surface charges associated with fine particles such as clays. Neglecting fine particle flocculation caused by salinity cannot be compensated through "calibration" because such parameter adjustment would affect fine sediment deposition through the model domain rather than only in more saline areas as tides move back and forth across the site.

Representation of Initial Bed Properties

As described in the FTS report, initial median particle diameters (dSO) for the sediment bed were determined through application of Equation 4-4 (see AQ, 2012 p.36). This equation uses model-calculated shear stresses to assign starting dSO values. This is problematic in several regards. The first is that the model results are used as a basis to artificially establish initial conditions that may have a significant influence on model results. The results presented in Figure 4-6 of the FTS report indicate that initial dSO values in the model have a systematic low bias relative to measured values for roughly 60% or more of the distribution. In some *cases*, the initial dSO values in the model may be lower than measured values by roughly a factor of 2 *(e.g.,* at the 60th percentile of the distribution, the initial dSO value in the model is roughly 60 j..lm whereas the measured value is roughly 150 j..tm}. Giving the nonlinearities in the governing equations the model uses for sediment transport calculations, this may artificially force the model to predict more sediment transport than is likely to occur. Overestimation biases at the low end of the sediment size distribution are less pronounced than underestimation biases as grain sizes increase. Model outcomes often depend on initial conditions. Because the model is used to both set the initial condition and generate sediment transport results, the reliability of sediment transport calculations cannot be determined by examining differences in bed composition over time (such differences are an outcome of differential transport of individual particle types).

Another limitation is that the approach described in the FTS report is only described in terms of probability distributions and does not show how spatial patterns of initial dSO values in the model compare to spatial patterns of measured values. Even if the probability distribution of measured dSO value was perfectly represented, it is still possible the spatial patterns of dSO values in the model may not be properly represented.

Net Sediment Transport Simulation within the Preliminary Site Perimeter

Net sediment transport simulation results within the Preliminary Site Perimeter have a systematic low bias relative to empirical estimates of sedimentation. As shown in Figure 4-24 of the FTS report, simulated ("predicted") net sedimentation rate (NSR) values are all less than 1 em/yr. In contrast, empirical NSR values range from roughly 1.5 to 3.5 em/yr. Similar deviations occur elsewhere in the domain. These biases are troubling because they suggest that the model is not a successful predictor of net sedimentation, even to within a factor of 2. The low bias that occurs in the PSP area is even more troubling because this is the area of primary interest for the modeling effort. Biases in the PSP suggest that the model may not be reliable when used to assess long-term transport or to estimate shear stresses and velocities for remedial design. If NSR calculations from the model are not reliable, gross erosion (bed scour) and gross deposition calculations within the PSP (and elsewhere) would not be reliable either because NSR is the difference between gross deposition and gross erosion.

Model Application at Spatial and Temporal Scales Finer than Scales Over Which Model Performance is Reliable

The FS notes that there are limits to model performance. For example, with respect to sediment transport (which, in turn, controls contaminant fate), the FS report (see AQ, 2013, Appendix A, p. 4) states that:

> *"The general pattern of net sedimentation predicted by the model is qualitatively consistent with known characteristics of the Model Study Area. At small spatial scales (e.g., single grid cell), the model uncertainty is higher; however, as the spatial scale increases, the uncertainty in the model's predictive capability decreases. This trend (i.e., decreasing uncertainty in model reliability with increasing spatial scale) is consistent with sediment transport models developed at other sites that have been successfully calibrated and used as a management tool."*

This means that model results are not expected to be reliable at the scale of individual grid cells or time steps but that averaging over broader spatial zones or longer timeframes (e.g., decades) generally yield closer correspondence between model results and measurements. However, in the FS fine scale model, outputs are essentially used to drive evaluations of alternatives.

Figure 4-31 of the FTS report presents probability distributions of measured and simulated suspended sediment concentrations (SSCs) and demonstrates that the model has a significant underestimation bias (i.e. simulated SSCs are lower than measured) for more than half the distribution and also has a large overestimation bias at the higher end of the concentration distribution. Comparisons of simulated and measured SSCs at individual monitoring stations (see Figure 4-32 through 4-43 of the FTS report) demonstrate that at many times (and at most stations) the model does not perform in a reliable manner. Collectively, these figures indicate that sediment transport model performance may not be reliable even at broader spatial scales or temporal scales.

Although data are sparse, simulated dioxin concentrations from the contaminant transport model appear to be in closer agreement with measurements than are results of the sediment transport model (see Figures 5-22 through 5-24 of the FTS report). This is problematic because it suggests that either:

1. Transport and fate of dioxins does not strongly depend on sediment transport; or

2. During calibration of the contaminant model, the balance of fate processes was not properly established and the parameters for one or more processes were inappropriately "tuned" to compensate for errors in other processes.

Case 1 (above) is inconsistent with the conceptual model for the site (CSM) as well as overall model implementation. Case 2 (above) seems more likely and suggests that the model may not be a reliable estimator of long-term trends because it does not properly represent the processes that affect dioxin concentrations in water and sediment. Further evaluation of the model and adjustment to its calibration may be needed.

Given the model's present performance characteristics, it is unclear how it can be reliably used to evaluate long-terms trends (as is needed in the FS alternatives analysis) or provide reliable estimates for cap design. The evaluations presented in the FTS and FS reports tend to overstate expected model reliability, which negatively influence evaluations of alternatives. <u>In particular, if the model does not reliably simulate net sediment transport and underestimates deposition within the Preliminary Site Perimeter, then the expected time for recovery of surface sediments will be overestimated. Overestimating the time for recovery could lead to potentially erroneous conclusions that remedial alternatives with more active approaches (e.g., removal) are less favorable.</u>

This is important because Alternatives 4-6 involve taking more action to reduce the toxicity, mobility, and volume of contamination. Potentially erroneous conclusions regarding timeframes for recovery could inappropriately favor alternatives that, for all practical purposes, leave contaminants in place.

Remedial Design and Operation, Maintenance and Monitoring {OM&M)

The alternatives presented in the Draft FS appear to meet the 2 threshold criteria of Protection of Human Health and the Environment and Compliance with ARARs and thus appear to be viable options for the FS. It must be noted that subsequent to remedy selection by USEPA, and after the Record of Decision (ROD) is issued, the remedial design phase will start. The below paragraphs offer comments related to post-ROD design and OM&M. Some are applicable to the finalization of the FS Report.

DESIGN

The Draft FS notes future design criteria that could be used for the selected remedy, including an approximate 100-year flood event occurring in 1994, with a peak discharge of 360,000 cfs and a maximum river stage height of 27 ft. above mean sea level. Tidal velocities ranging from 0.5 – 1 foot per second. However, based on the issues noted with the TCRA, these criteria may not be adequate for the future permanent remedy to be selected by USEPA. Based on the information reviewed for the TCRA, it is recommended that the root causes of failure and acceptable design criteria outlined in the ACOE's report be carried to the remedy ultimately selected for the SJWPS site. As noted in the ACOE report:

> The armor design followed the armor layer design procedures of the EPA ARCS Guidance for In- Situ Subaqueous Capping of Contaminated Sediments (EPA 905-896-004} (Palermo et al. 1998}. However, additional design considerations should include bearing capacity, slopes of cap sidewalls, slope stability of the foundation and the capping material, stone sizing, permeability, wave runup and overtopping as described in the USACE Coastal Engineering Manual (Part VI) EM 1110-2-1100 (1June 2006}.

The remedy selected in the future -such as capping, treatment, removal, or a combination of approaches- is required to undergo a detailed design prior to construction. The design should utilize site-specific information, recommendations from Federal Agencies and other stakeholders, and include the best criteria and modeling in the design (e.g., wave runup; overtopping; storm / flood stage; flow rates; flow velocity and erosion potential; sedimentation; storm surge; wind loadings} to ensure that the most effective and permanent remedy is constructed for protection of human health and the environment, and for the benefit of the many existing and future uses of the area.

It is recommended that a pre-design investigation (PDI} be conducted to confirm physical nature of sediments, condition of site area (topography / bathymetry}, and extents of COCs in sediment/soil exceeding PCLs. The PDI would provide recent information for the remedial design phase, such as if contaminant levels in surface sediment and soil have been affected by land use (e.g., new upland asphalt installed; local dredging) or weather events (flooding; alterations in channel geometry) which may have spread or incidentally contained contamination. The MNR periodic sampling program can also be refined during the PDI.

Institutional controls (ICs, such as fencing, signage, and buoys) and best management practices (BMPs, such as erosion controt silt curtains, stormwater pollution protection) associated with the selected remedy can be more fully scoped during the PDI, as well. It **should be confirmed that FS costs account for design and PDI activities.**

OM&M

As alluded to earlier in this memo, TCRA issues/concerns that have been identified reinforce the need for a well-planned OM&M program over the life of the selected remedy at the site. It is understood that an in-depth operation, maintenance and monitoring program will be needed

- To verify selected remedy is in-place and functional
- To verify sediment and tissue concentrations post-remedy

Such monitoring program will need to be scoped and formulated in the remedial design, and should incorporate input from USEPA and stakeholders. Items to be scoped include, but are not limited to,

- Key parameters to be inspected (rock wall, liners)
- Means and frequency of inspections and reporting
- Corrective action plan
- Natural Recovery monitoring (e.g., sediment/tissue sampling; sediment deposition rates)
- Verification of ICs (including site management plans to be followed if excavation or dredging is planned for contamination areas)

References

AQ. 2012. Chemical Fate and Transport Modeling Study: San Jacinto River Waste Pits Superfund Site. Prepared by Anchor QEA, LLC., Ocean Springs, Mississippi. 303 p. October, 2012.

AQ. 2013. Draft Feasibility Study Report: San Jacinto Waste Pits Superfund Site. Prepared by Anchor QEA, LLC., Ocean Springs, Mississippi. 135 p. plus appendices. August, 2013.

TWDB. 2013. Volumetric and Sedimentation Survey of Lake Houston, December 2011 Survey (Draft). Texas Water Development Board, Austin, Texas. 45 p.

Any questions concerning these comments should be communicated to Linda Henry, Port of Houston Authority.

Sincerely,

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